FL SWITCH SMCS 6GT/2SFP

Smart Managed Compact Switch with six Gigabit ports and two Gigabit SFP slots

AUTOMATION

Data Sheet
7593_en_00

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1 Description

1.1 Smart Managed Compact Switch (SMCS)

The Smart Managed Compact Switch with one Gigabit on all eight ports enables the cost-effective creation of managed Ethernet networks in industrial environments with maximum throughput rates. Two of the ports are fiber optic ports in SFP format. This means that both multi-mode and single-mode glass fibers can be used. The compact switches in metal housing support the use of the optional FL MEM PLUG. The FL MEM PLUG is a plug-in parameterization memory on which the entire configuration of the device can be stored so that it can be transferred to another device, if required.

1.2 Properties of the SMCS

- 10/100/1000 Mbps on all RJ45 ports
- Two ports as SFP slots, six as RJ45
- Management via SNMP (Simple Network Management Protocol), via WBM (web-based management) or via serial interface (HyperTerminal)
- Redundant supply voltage connection
- Floating alarm contact with adjustable function
- Labeling fields for the device and the individual ports
- Redundancy with Rapid Spanning Tree (RSTP according to IEEE 801.1w) and Fast Ring Detection (compatible with FL SWITCH MM HS and FL SWITCH MCS with Fast Ethernet)
- Local diagnostic and status indicators
- Optional FL MEM PLUG supported as a plug-in parameterization memory
- LLDP support (IEEE 802.1ab)
  - Improved error location detection
  - Improved device replacement
  - More efficient network configuration

1.3 Fields of application

Typical fields of application for the SMCS range from high-performance connection to Gigabit office networks through the function of a powerful distributor in control cabinets to typical use in Industrial Ethernet applications. A special feature is the support of PROFINET and Ethernet/IP.

For additional information about the function and operation of the SMCS, please refer to the "UM EN FL SWITCH SMCS" product-specific user manual. It can be downloaded at www.download.phoenixcontact.com.

Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

This data sheet is valid for all products listed on the following page:

2 Ordering data

Products

Description	Type	Order No.	Pcs./Pkt.
Smart Managed Compact Switch with six Gigabit ports in RJ45 format and two Gigabit SFP slots	FL SWITCH SMCS 6GT/2SFP	2891479	1
Plug-in parameterization memory	FL MEM PLUG	2891258	1
Plug-in parameterization memory with MRP manager license	FL MEM PLUG/MRM	2891770	1
SFP slot module in SFP format - multi-mode	FL SFP SX	2891754	1
SFP slot module in SFP format - single-mode	FL SFP LX	2891767	1
SFP slot module in SFP format - single-mode long haul	FL SFP LX LH	2989912	1

Accessories

Description	Type	Order No.	Pcs./Pkt.
Configuration cable for connecting the switch with a PC, V.24 (RS-232)	PRG CAB MINI DIN	2730611	1
Universal end clamp	E/NS 35 N	080088 6	1
Factory Manager startup/diagnostic software	FL SWT	2831044	1
Network monitoring with HMI/SCADA systems	FL SNMP OPC SERVER	2832166	1
Patchbox 8 x RJ45 CAT 5e pre-assembled, can be retrofitted	FL PBX 8TX	2832496	1
Patchbox 6 x RJ45 CAT 5e and 4 SC-RJ, glass pre-assembled, can be retrofitted	FL PBX 6TX/4FX	2832506	1
Patch angle with two RJ45 network connections CAT5e including Layer 1 security elements	FL PF SEC 2TX	2832687	1
Patch angle with eight RJ45 network connections CAT5e including Layer 1 security elements	FL PF SEC 8TX	2832690	1
Patch angle with two RJ45 network connections CAT5e	FL PF 2TX CAT5E	2891165	1
Patch angle with eight RJ45 network connections CAT5e	FL PF 8TX CAT5E	2891178	1
Patch angle with two RJ45 network connections CAT6	FL PF 2TX CAT 6	2891068	1
Patch angle with eight RJ45 network connections CAT6	FL PF 8TX CAT 6	2891071	1
Patch cable, CAT **6**, pre-assembled, 0.3 m long	FL CAT6 PATCH 0,3	2891181	10
Patch cable, CAT **6**, pre-assembled, 0.5 m long	FL CAT6 PATCH 0,5	2891288	10
Patch cable, CAT **6**, pre-assembled, 1.0 m long	FL CAT6 PATCH 1,0	2891385	10
Patch cable, CAT **6**, pre-assembled, 1.5 m long	FL CAT6 PATCH 1,5	2891482	10
Patch cable, CAT **6**, pre-assembled, 2.0 m long	FL CAT6 PATCH 2,0	2891589	10
Patch cable, CAT **6**, pre-assembled, 3.0 m long	FL CAT6 PATCH 3,0	2891686	10
Patch cable, CAT **6**, pre-assembled, 5.0 m long	FL CAT6 PATCH 5,0	2891783	10
Patch cable, CAT **6**, pre-assembled, 7.5 m long	FL CAT6 PATCH 7,5	2891880	10
Patch cable, CAT **6**, pre-assembled, 10 m long	FL CAT6 PATCH 10	2891887	10
Patch cable, CAT 5, pre-assembled, 0.3 m long	FL CAT5 PATCH 0,3	2832250	10
Patch cable, CAT 5, pre-assembled, 0.5 m long	FL CAT5 PATCH 0,5	2832263	10
Patch cable, CAT 5, pre-assembled, 1.0 m long	FL CAT5 PATCH 1,0	2832276	10
Patch cable, CAT 5, pre-assembled, 1.5 m long	FL CAT5 PATCH 1,5	2832221	10
Patch cable, CAT 5, pre-assembled, 2.0 m long	FL CAT5 PATCH 2,0	2832289	10
Patch cable, CAT 5, pre-assembled, 3.0 m long	FL CAT5 PATCH 3,0	2832292	10
Patch cable, CAT 5, pre-assembled, 5.0 m long	FL CAT5 PATCH 5,0	2832580	10
Patch cable, CAT 5, pre-assembled, 7.5 m long	FL CAT5 PATCH 7,5	2832616	10
Patch cable, CAT 5, pre-assembled, 10.0 m long	FL CAT5 PATCH 10	2832629	10

Documentation

Description	Type	Order No.	Pcs./Pkt.
User manual for the Smart Managed Compact Switch	UM EN FL SWITCH SMCS	2910169	-

3 Technical data

General data	
Function	Smart Managed Compact Switch, Ethernet/Fast Ethernet/Gigabit switch; conforms to standard IEEE 802.3/802.3u/802.3ab
Switch principle	Store-and-Forward
Address table	4000 MAC addresses
SNMP	Version 2c
Transmission capacity per port 64-byte packet size, half duplex	At 10 Mbps: 14,880 pps (packets per second) At 100 Mbps: 148,800 pps at 1000 Mbps 1,488,100 pps
Supported MIBs	MIB II , LLDP_PN MIB, and private SNMP objects from Phoenix Contact
Housing dimensions (width x height x depth) in mm	128 x 110 x 69 (depth from top edge of DIN rail) 128 x 150 x 69 (depth from top edge of DIN rail) With FL MEM PLUG (accessories)
Permissible operating temperature	0°C to 55°C
Permissible storage temperature	-40°C to +85°C
Degree of protection	IP20, IEC 60529
Protection class according to EN 61131-2, IEC 61131-2	Class 3
Humidity	
Operation	5% to 95%, no condensation
Storage	5% to 95%, no condensation
Air pressure	
Operation	86 kPa to 108 kPa, 1500 m above sea level
Storage	66 kPa to 108 kPa, 3500 m above sea level
Ambient compatibility	Free from substances that would hinder coating with paint or varnish according to VW specification
Mounting position	Perpendicular to a standard DIN rail
Connection to protective earth ground	Snapped onto a grounded DIN rail
Weight	650 g, typical

Supply voltage (US1/US2 redundant)	
Connection	Via COMBICON; conductor cross section = 2.5 mm^2, maximum
Nominal value	24 V DC
Permissible voltage range	18.0 V DC to 32.0 V DC
Permissible ripple (within the permissible voltage range)	3.6 V_{PP}
Test voltage	500 V DC for one minute
Maximum current consumption on US at 24 V DC	0.6 A
Maximum power consumption	14.5 W

Interfaces on the SMCS	
Number of Ethernet ports with Gigabit support	8
V.24 (RS-232) communication interface	
Connection format	Mini-DIN female connector
Floating alarm contact	
Voltage	24 V DC
Current carrying capacity	100 mA

Ethernet interfaces on the SMCS	
RJ45 interfaces	
Number	6 with auto crossing and auto negotiation
Connection format	8-pos. RJ45 female connector on the switch
Connection medium	Twisted pair cable with a conductor cross section of 0.14 mm^2 to 0.22 mm^2
Cable impedance	100 Ohm
Transmission speed	10/100/1000 Mbps
Maximum network segment expansion	100 m

Ethernet interfaces on the SMCS (continued)	
General characteristics of the glass fiber ports	
Number	2
Connection format	Gigabit SFP slot module
Connection medium	Glass fiber
Connector	LC Format
Transmission speed	1000 Mbps
Maximum network segment expansion	Depends on the SFP module used
Fiber type	Depends on the SFP module used
Laser protection class	1
Characteristics of the 1000 Mbps multi-mode ports (FL SFP SX)	
Data transmission rate	1.25 Gbps full duplex
Wavelength	850 nm
Maximum transmission length	550 m fiber optic 50/125 µm 250 m fiber optic 62.5/125 µm
Transmission power	
Minimum	-9 dBm
Maximum	-4 dBm
Receiver sensitivity	
Minimum	-17 dBm
Characteristics of the 1000 Mbps single-mode ports (FL SFP LX)	
Data transmission rate	1.25 Gbps full duplex
Wavelength	1310 nm
Maximum transmission length with **single-mode fiber**	30 km fiber optic 9/125 µm (0.4 dB/km)
Maximum transmission length with **multi-mode fiber**	550 m fiber optic 50/125 µm 550 m fiber optic 62.5/125 µm
Transmission power	
Minimum	-5 dBm
Maximum	0 dBm
Receiver sensitivity	
Minimum	-23 dBm
Characteristics of the 1000 Mbps single-mode ports (FL SFP LH)	
Data transmission rate	1.25 Gbps full duplex
Wavelength	1550 nm
Maximum transmission length with **single-mode fiber**	80 km fiber optic 9/125 µm (0.3 dB/km)
Transmission power	
Minimum	0 dBm
Maximum	5 dBm
Receiver sensitivity	
Minimum	-24 dBm
Maximum optical input power	0 dBm

Mechanical tests	
Shock test according to IEC 60068-2-27	Operation: 25g, half-sine shock pulse Storage/transport: 50g, half-sine shock pulse
Vibration resistance according to IEC 60068-2-6	Operation/storage/transport: 5g, 10 - 150 Hz
Free fall according to IEC 60068-2-32	1 m

Conformance with EMC directives	
Developed according to IEC 61000-6.2	
Emitted interference acc. to EN55022: 1998 + A1: 2000 + A2: 2003 (interference voltage)	Class B (residential)
Emitted interference acc. to EN55011: 1998 + A1: 1999 + A2: 2002 (electromagnetic interference)	Class B (residential)

Conformance with EMC directives	
Noise immunity according to EN61000-4-2 (IEC1000-4-2) (ESD)	Requirements according to DIN EN 61000-6-2
Contact discharge:	Test intensity 2, criterion B
Air discharge:	Test intensity 3, criterion B
Indirect discharge:	Test intensity 2, criterion B
Noise immunity according to EN61000-4-3 (IEC1000-4-3) (electromagnetic fields)	Requirements according to DIN EN 61000-6-2 Test intensity 3, criterion A
Noise immunity according to EN61000-4-4 (IEC1000-4-4) (burst)	Requirements according to DIN EN 61000-6-2
Data lines:	Test intensity 2, criterion B
Power supply:	Test intensity 3, criterion B
Noise immunity according to EN61000-4-5 (IEC1000-4-5) (surge)	Requirements according to DIN EN 61000-6-2
Data lines:	Test intensity 2, criterion B
Power supply:	Test intensity 1, criterion B
Noise immunity according to EN61000-4-6 (IEC1000-4-6) (conducted)	Requirements according to DIN EN 61000-6-2 Test intensity 3, criterion A

Additional certifications	
RoHS	EEE 2002/95/EC. - WEEE 2002/96/EC

3.1 General information

WARNING:
Disregarding this warning may result in damage to equipment and/or serious personal injury. Only qualified personnel may start up and operate these devices. According to the safety instructions in this text, qualified personnel are persons who are authorized to start up, to ground, and to mark devices, systems, and equipment according to the standards of safety technology. In addition, these persons must be familiar with all warning instructions and maintenance measures in this text.

WARNING:
FL SWITCH SMCS 6GT/2SFP modules are designed exclusively for SELV operation according to IEC 950/EN 60950/VDE 0805.

4 Installation and Assembly/Removal

Install the Smart Managed Compact Switch on a clean DIN rail according to EN 60715. To avoid contact resistance only use clean, corrosion-free DIN rails. End clamps can be mounted on both sides of the module to stop the modules from slipping on the DIN rail.

4.1 Assembly

1. Place the module onto the DIN rail from above. The upper holding keyway must be hooked onto the top edge of the DIN rail.
2. Push the module from the front towards the mounting surface.
3. Once the module has been snapped on properly, check that it is fixed securely on the DIN rail.

4.2 Removal

1. Pull the locking latch down using a screwdriver, needle-nose pliers or similar.
2. Pull the bottom edge of the module away from the mounting surface.
3. Pull the module diagonally upwards away from the DIN rail.

4.3 Connecting the 24 V DC supply voltage

The SMCS is operated using a 24 V DC voltage, which is applied via COMBICON. If required, the voltage can also be supplied redundantly

If redundant supply voltage monitoring is active (default setting), an error is indicated if only one voltage is applied. A jumper between US1 and US2 prevents this error message. It is also possible to deactivate monitoring in web-based management or via SNMP.

Typical supply with one (A) or two (B) voltage sources

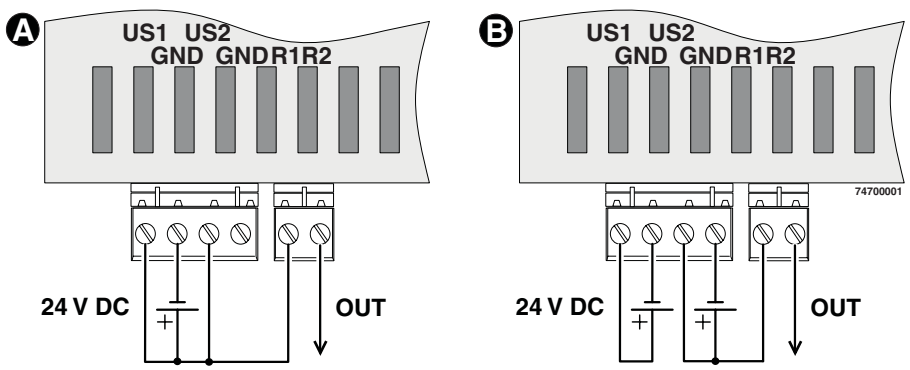


Figure 1 Supply of the SMCS

4.4 Alarm contact

The switch has a floating alarm contact. An error is indicated when the contact is opened.

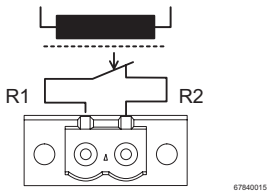


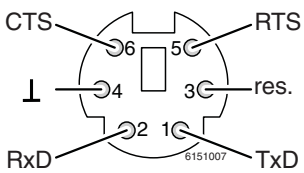
Figure 2 Circuit diagram for the alarm contact

The indicated error states are configured in web-based management or via SNMP.

4.5 V.24 (RS-232) interface for external management

The 6-pos. mini-DIN female connector provides a serial interface to connect a local management station. It can be used to connect a VT100 terminal or a PC with corresponding terminal emulation to the management interface. Set the following transmission parameters:

RS-232 (V.24) interface



Bits per second	38400
Data bits	8
Parity	None
Stop bits	1
Flow control	None

Figure 3 Assignment of the V.24 (RS-232) interface and the required transmission parameters

4.6 Assignment of the RJ45 Ethernet connectors

Please note that for operation with 1000 Mbps (Gigabit), cables with four twisted pairs (eight wires), which meet the requirements of Cat 5e as a minimum, must be used.

4.7 Pin assignment of RJ45 connectors

Pin number	10BASE-T/10 Mbps	100BASE-T/100 Mbps	1000BASE-T/1000 Mbps
1	TD+ (transmit)	TD+ (transmit)	BI_DA+ (bidirectional)
2	TD- (transmit)	TD- (transmit)	BI_DA- (bidirectional)
3	RD+ (receive)	RD+ (receive)	BI_DB+ (bidirectional)
4	-	-	BI_DC+ (bidirectional)
5	-	-	BI_DC- (bidirectional)
6	RD- (receive)	RD- (receive)	BI_DB- (bidirectional)
7	-	-	BI_DD+ (bidirectional)
8	-	-	BI_DD- (bidirectional)

4.8 Grounding

NOTE: Grounding protects people and machines against hazardous voltages. To avoid these dangers, correct installation, taking the local conditions into account, is vital.

All Factory Line devices must be grounded so that any possible interference is shielded from the data telegram and discharged to ground potential.

A wire of at least 2.5 mm^2 must be used for grounding. When mounting on a DIN rail, the DIN rail must be connected with protective earth ground using grounding terminal blocks. The module is connected to protective earth ground via the metal base element.

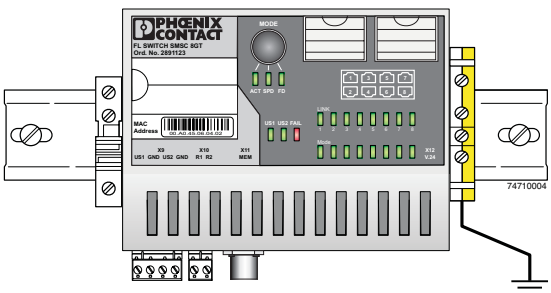


Figure 4 Switch on a grounded DIN rail

4.9 Status and diagnostic indicators

Des.	Color	Status	Meaning
US1	Green	ON	Supply voltage 1 in the tolerance range
		OFF	Supply voltage 1 too low
US2	Green	ON	Supply voltage 2 in the tolerance range
		OFF	Supply voltage 2 too low
FAIL	Red	ON	Alarm contact open, i.e., an error has occurred
		OFF	Alarm contact closed, i.e., an error has not occurred
A Link LED is located on the front of the SMCS for each port			
LNK (Link)	Green	ON	Link active
		OFF	Link inactive
An additional LED is located on the front of the SMCS for each port. The function of the second LED (MODE) for each port can be set using the MODE switch (see also example below). There are three options:			
ACT (Activity)	Green	ON	Sending/receiving telegrams
		OFF	Not sending/receiving telegrams
SPD (Speed)	Green/ orange	ON (orange)	1000 Mbps
		ON (green)	100 Mbps
		OFF	10 Mbps if Link LED is active
FD (Duplex)	Green	ON	Full duplex
		OFF	Half duplex

4.10 IP address assignment

Two mechanisms are available for the assignment of the IP address: BootP or via the V.24 (RS-232) interface. By default upon delivery, the IP address is assigned via BootP. The Factory Manager configuration software has been optimized for use with Smart Managed Compact Switches and is the easiest way to assign the IP address. The assignment mechanism can be modified via web-based management or via the V.24 (RS-232) interface.

5 Hardware functions

"Store and forward" Ethernet switching

All data telegrams that are received by the switch are saved and their validity is checked. Invalid or faulty data packets (> 1522 bytes or CRC errors) and fragments (< 64 bytes) are rejected. Valid data telegrams are forwarded by the switch. The switch always forwards the data using the data transmission speed that is used in the destination network segment.

Multi-address function

The switch independently learns the addresses for termination devices, which are connected via a port, by evaluating the source addresses in the data telegrams. Only packets with unknown addresses, with a source address of this port or with a multicast/broadcast address in the destination address field are forwarded via the corresponding port. The switch can store up to 4000 addresses in its address table with an aging time of approximately 40 seconds. This is important when more than one termination device is connected to one or more ports. In this way, several independent subnetworks can be connected to one switch.

Diagnostics via the alarm contact

If either or both of the supply voltages fails, the alarm contact opens. On a restart, the switch executes a hardware selftest. In the event of an error during the selftest, an SNMP trap is transmitted.

Status and diagnostic indicators

These indicators provide information about the status of the SMCS at all times. Local diagnostics without additional tools is possible thanks to numerous LEDs.

Auto crossing

Due to auto crossing of the transmit and receive cables of a twisted pair interface, it is no longer necessary to distinguish between 1:1 and crossover Ethernet cables.

Auto negotiation

Auto negotiation is a method whereby the switch automatically detects the operating parameters for the connected network and sets the corresponding parameters (10 Mbps/100 Mbps/1000 Mbps data transmission rate and half/full duplex transmission mode) for its RJ45 ports. Automatic port setting eliminates the need for manual intervention by the user. The auto negotiation function can be activated/deactivated via the web interface.

6 Software functions

6.1 SNMP

SNMP (Simple Network Management Protocol) can be used to monitor Ethernet communication even via network management systems. Management systems, such as a PC with Factory Manager, can read and modify configuration and diagnostic data from network devices via SNMP. Supported MIBs: Management

Information Base II (MIB 2) according to RFC1213, LLDP MIB, RSTP MIB, RMON MIB (only group statistics), bridge MIB (groups: dot1dStp, dot1dBase, dot1dTpAgingTime, and private MIBs).

6.2 IEEE 802.1w - Rapid Reconfiguration Spanning Tree Protocol (RSTP)

Rapid Spanning Tree is a procedure enabling the use of redundant Ethernet structures. Via RSTP, the meshed topologies of redundant structures are suppressed logically and converted acyclically to tree structures. In meshed networks, two nodes may be connected in two or more ways (loop). Due to these loops, data packets would circle endlessly in the network. This is why these loops are replaced by a logical deterministic path using an RSTP algorithm. The loops are eliminated by temporarily switching off the individual switch ports in a specific way. All active ports as well as deactivated ports receive data packets. However, the data packets are only forwarded by active ports. The deactivated ports operating in hot standby mode are reintegrated into the network, if required, by modifying the network topology.

6.3 Web-based management

In addition to management via SNMP, the switch also supports integrated web-based management. This provides detailed diagnostic and configuration options for startup, operation, and in the event of an error, as well as comprehensive network and device information.

6.4 Use of the Smart Mode

Smart Mode allows the user to change the operating mode of the switch by pressing the mode button. Thus it is possible to change the operating mode without accessing the web-based management.

The operating mode can be changed with the following sequences:

– Activating the Smart Mode
– Selecting the desired operating mode
– Storing the selected operating mode by exiting the Smart Mode

The SMCS offers the following settings with the Smart Mode:

– Resetting to default settings
– Activating the PROFINET mode
– Exiting the Smart Mode without changes

Activating the Smart Mode

After the boot phase of the switch, the mode button must be pressed for more than five seconds. The three LEDs below the mode button blink when the Smart Mode is active. When the Smart Mode becomes active the switch is in the "Exit without change" status.

Selecting the operating mode

As soon as the Smart Mode was called, the setting is selected by pressing the mode button shortly. After having selected the desired setting, exit the Smart Mode and the selected status is stored.

Exiting the Smart Mode

To exit the Smart Mode keept the mode button pressed for more than three seconds. The operating mode selected last is accepted and activated.

Possible operating modes in the Smart Mode

The SMCS supports selection of the following operating modes in the Smart Mode (see also example below):

Mode	ACT LED 1	SPD LED 2	FD LED 3
Exiting the Smart Mode without changes	OFF	OFF	ON
Resetting to default settings	OFF	ON	OFF
Activating the PROFINET mode	OFF	ON	ON

7 PROFINET Physical Device (PDEV)

General function description

The PDEV function provides an extended scope of functions for switches in PROFINET mode. This includes displaying neighbor and topology information in the engineering tool. This information is determined using the Link Layer Discovery Protocol (LLDP) and can be used to compare the desired and actual network.

In addition, the PDEV function is used to display the transmitted information via the Ethernet ports.

The PDEV function uses two new submodules:

– Interface submodule with port number 0x8X00 (X: 0 to F)
– Port submodule with port number 0x8IXX (I: Interface ID; X: Port number)

These submodules are represented in the Step7 engineering tool. PROFINET communication enables information about the port speed, duplex mode, and the link status to be read. An engineering tool reads and then displays the neighbor and topology information via SNMP.

PROFINET stack and PDEV function

The PDEV function is supported by PROFINET stack Version 2.2. The following functions are supported by PN stack 2.2:

– Link status, port mode, and port MAC address can be requested via the port
– Storing of PDEV data
– Reorganization of submodules for integrating interfaces and new ports
– Use of the PN stack LLDP in PN mode (used for neighbor and topology detection)
– Support for device replacement and application redundancy

PDEV in the Firmware

The PDEV function can be used for the FL SWITCH SMCS device range in firmware Version 2.2 or later. In addition, the corresponding version of the GSDML file must be used (the FDCML file does not support PDEV at present). These files are used to describe the device function and can be imported into an engineering tool.

8 Housing dimensions

Depth 69 mm from top edge of DIN rail

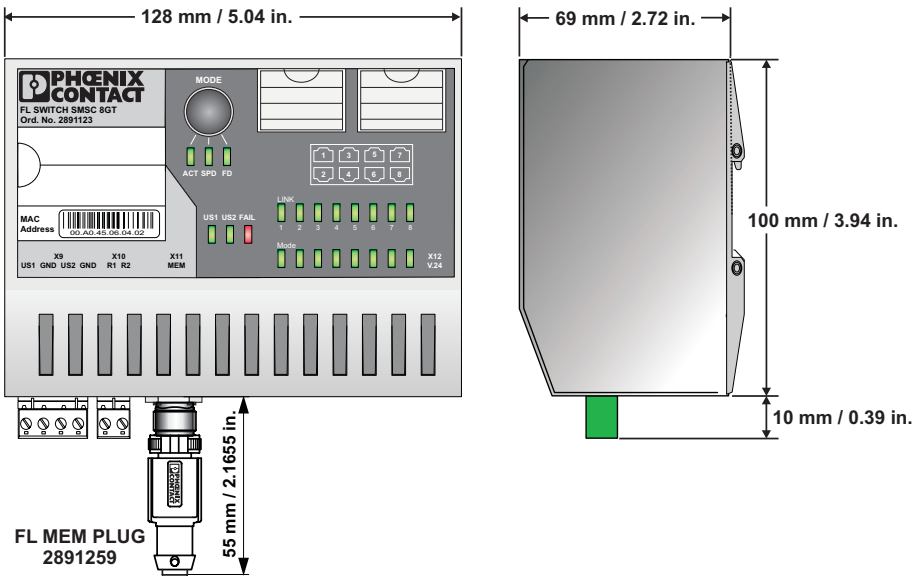


Figure 5 Housing dimensions

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